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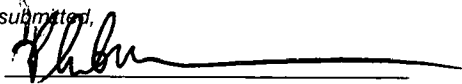
EU 947 178 239 US

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Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
WEAR PROOF DÉTENTE FOR FOLDING MIRRORS					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input type="checkbox"/> Customer Number			Place Customer Number Bar Code Label here		
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification	Number of Pages	14	<input type="checkbox"/> CD(s), Number		
<input checked="" type="checkbox"/> Drawing(s)	Number of Sheets	4	<input checked="" type="checkbox"/> Other (specify)	Return Receipt Postcard	
<input checked="" type="checkbox"/>	Application Data Sheet. See 37 CFR 1.76				
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input type="checkbox"/>	Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)
<input type="checkbox"/>	A check or money order is enclosed to cover the filing fees.				
<input checked="" type="checkbox"/>	The Director is hereby authorized to charge/filing fees or credit any overpayment to Deposit Account Number:				500906
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[Page 1 of 2]

Respectfully submitted,

SIGNATURE



TYPED or PRINTED NAME Philip R. Warn

TELEPHONE (248) 364-4300

Date 2/18/04

REGISTRATION NO.

(If appropriate)

Docket Number:

32775

SCH-00083

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Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$ 160.00

Complete if Known

Application Number	To be assigned
Filing Date	To be assigned
First Named Inventor	Ryan Proctor
Examiner Name	
Art Unit	
Attorney Docket No.	SCH-00083

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None☒ Deposit Account:

Deposit Account Number	500906
Deposit Account Name	Schefenacker Vision Systems USA Inc.

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☐ Charge fee(s) indicated below ☒ Credit any overpayments☒ Charge any additional fee(s) or any underpayment of fee(s)☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.**FEE CALCULATION****1. BASIC FILING FEE**

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1001 770	2001 385	Utility filing fee	
1002 340	2002 170	Design filing fee	
1003 530	2003 265	Plant filing fee	
1004 770	2004 385	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	160.00
SUBTOTAL (1)			(\$ 160.00)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Extra Claims	Fee from below	Fee Paid
Independent	-20** =	X	= 0.00
Multiple Dependent	-3** =	X	= 0.00
			= 0.00

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1202 18	2202 9	Claims in excess of 20	
1201 86	2201 43	Independent claims in excess of 3	
1203 290	2203 145	Multiple dependent claim, if not paid	
1204 86	2204 43	** Reissue independent claims over original patent	
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)			(\$ 0.00)

**or number previously paid, if greater; For Reissues, see above

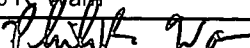
FEE CALCULATION (continued)**3. ADDITIONAL FEES**

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	1053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for <i>ex parte</i> reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	
1252 420	2252 210	Extension for reply within second month	
1253 950	2253 475	Extension for reply within third month	
1254 1,480	2254 740	Extension for reply within fourth month	
1255 2,010	2255 1,005	Extension for reply within fifth month	
1401 330	2401 165	Notice of Appeal	
1402 330	2402 165	Filing a brief in support of an appeal	
1403 290	2403 145	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,330	2453 665	Petition to revive - unintentional	
1501 1,330	2501 665	Utility issue fee (or reissue)	
1502 480	2502 240	Design issue fee	
1503 640	2503 320	Plant issue fee	
1460 130	1460 130	Petitions to the Commissioner	
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	
1806 180	1806 180	Submission of Information Disclosure Stmt	
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	
1809 770	2809 385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 770	2810 385	For each additional invention to be examined (37 CFR 1.129(b))	
1801 770	2801 385	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 0.00)**SUBMITTED BY**

Name (Print/Type)	Philip R. Warr	Registration No. (Attorney/Agent)	32775	Telephone	(248) 364-4300
Signature		Date	February 18, 2004		

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WEAR-PROOF DÉTENTE FOR FOLDING MIRRORS

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates generally to a folding mechanism for a vehicle side mirror and, more particularly, to a folding mechanism for a vehicle side mirror, where the folding mechanism includes a plurality of détentes having different inner and outer ramp angles to prevent wear.

2. Discussion of the Related Art

[0002] Vehicles employ side mirrors that allow the vehicle operator to see behind and to the side of the vehicle. State of the art side mirrors are sometimes elaborate assemblies that include various options and features that increase the operator's ability to see objects, more safely operate the vehicle, provide a more aesthetically pleasing appearance, etc. One common vehicle side mirror design employs a folding mechanism that allows the mirror to be rotated relative to a mounting bracket so that the mirror can be folded towards the vehicle in both a forward and backward direction. The folding mechanism allows the mirror to be put in a more desirable configuration during parking or the like so that the side mirror has less chance of being damaged.

[0003] One particular side mirror folding mechanism design employs a pivot tube and pivot spring in combination with a case frame and base frame, where the case frame pivots relative to the base frame on the pivot tube. The base frame includes one or more détentes having angled edge ramps that cooperate with specially configured recesses in the case frame. When the case

frame is in the unfolded, forward-folded or rearward-folded position, the détentes align with and are secured within the recesses. By applying manual or motorized pressure to the case frame, the case frame rotates on the pivot tube against the bias of the pivot spring. The ramped edges of the détentes allow the détentes to move out of the recesses.

[0004] It has been observed that this mirror folding design causes the détentes to wear at the outside edge of the ramps where the load from the pivot spring is concentrated. Such a localized stress point on the détentes causes a premature failure because the détentes wear out too quickly, reducing the ability of the folding mechanism to maintain the side mirror in the unfolded configuration.

SUMMARY OF THE INVENTION

[0005] In accordance with the teachings of the present invention, a folding assembly for a vehicle side mirror is disclosed that employs specialized ramped détentes. The folding assembly includes a pivot tube and a pivot spring rotatably coupled to a case frame and rigidly coupled to a base frame. The base frame includes a series of ramped détentes that are seated within corresponding recesses in the case frame. The inside angle of the ramps of the détentes is steeper than the outside angle of the ramps of the détentes according to a predetermined formula so that when the case frame is rotated relative to the base frame, and the détentes move out of their recesses, the force of the rotation

is distributed along the entire length of the ramp to increase the durability performance of the mirror and thus its longevity.

[0006] Additional advantages and features of the present invention will become apparent from the following description and appended claims, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Figure 1 is a perspective view of a vehicle side mirror mounted to a vehicle by a folding assembly, according to an embodiment of the present invention;

[0008] Figure 2 is an exploded perspective view of the vehicle side mirror shown in figure 1 separated from the vehicle;

[0009] Figure 3 is a broken-away perspective view of a base frame of the vehicle side mirror shown in figure 1;

[0010] Figure 4 is a top view of the base frame along line 4-4 in figure 3;

[0011] Figure 5 is a bottom view of a case frame of the vehicle side mirror along line 5-5 in figure 2;

[0012] Figure 6 is a cross-sectional view of a ramped détente of the side mirror through line 6-6 in figure 4; and

[0013] Figure 7 is a cross-sectional view of a ramped détente of the side mirror through line 7-7 in figure 4.

DETAILED DISCUSSION OF THE EMBODIMENTS

[0014] The following discussion of the embodiments of the invention directed to a specially configured ramped détente associated with a folding assembly of a vehicle side mirror is merely exemplary in nature, and is in no way intended to limit the invention or its applications or uses.

[0015] Figure 1 is a perspective view of a vehicle side mirror assembly 10 mounted to a vehicle 12. Figure 2 is an exploded perspective view of the side mirror assembly 10 separated from the vehicle 12. The side mirror assembly 10 includes a mirror housing 14 mounted on an internal case frame 16 (figure 5), and a mounting arm 20 including an internal base frame 24 (figure 4). The case frame 16 forms the support structure of the foldable portion of the mirror assembly 10 and the base frame 24 forms the support structure of the mounting structure of the mirror assembly 10.

[0016] The case frame 16 and the housing 14 are pivotally mounted to the base frame 24 and the mounting arm 20 by a folding assembly 28, according to an embodiment of the present invention. The folding assembly 28 includes a specially configured pivot tube 30 and a pivot spring 32. The pivot tube 30 includes a tube portion 26 having an upper rim 34 and two rows of symmetrically disposed tabs 36, as shown. The case frame 16 includes a specially configured bore 38 including a narrow portion 40 and a widened portion 42 defining a shoulder 44 therebetween. The bore 38 further includes symmetrically disposed notches 46 defining projections 48 around the

circumference of the shoulder 44. The size and orientation of the notches 46 allow the tabs 36 to pass through the bore 38.

[0017] The base frame 24 includes a cylindrical mounting member 50 having an annular top portion 56 with a circular opening 62 therein. Figure 3 is a perspective view of part of the mounting arm 20. A series of alternating notches 52 and projections 54 are formed around the edge of the opening 62. The mounting member 50 has a diameter that corresponds with the diameter of the widened portion 42 so that the mounting member 50 is positioned therein. The notches 46 and 52 align with each other, the projections 48 and 54 align with each other, and the bottom end of the tube portion 26 is positioned within the mounting member 50. Each of the housing 14, the mounting arm 20, the case frame 16 and the base frame 24 are molded members molded from a suitable plastic.

[0018] Figure 4 is a top view of the mounting member 50 along line 4-4 in figure 3 and figure 5 is a bottom view of the bore 38 along line 5-5 in figure 2. According to the invention, the mounting member 50 includes a plurality symmetrically disposed ramped détentes 58 having angled side edges 60 that are formed on the top portion 56. Also, the bore 38 includes corresponding angled edge recesses 64 formed in an under surface of the shoulder 44. In an alternate embodiment consistent with the discussion herein, the mounting member 50 includes the recesses and the bore includes the détentes. The length of the détentes 58 is defined by an outside long radius r_2 of the mounting member 50 and an inside short radius r_1 of the opening 62 for a particular mirror

design. The width a and the height b of the détentes 58 are also application specific. In this embodiment, there are three symmetrically disposed détentes 58 for each of the unfolded, forward-folded and rearward-folded positions. However, this is by way of a non-limiting example in that other mirror designs may have less or more détentes 58.

[0019] As will be discussed in more detail below, an inner end 68 of the ramped edges 60 of the détentes 58 and the corresponding ramped edges of the recesses 64 has a steeper angle β_1 than the angle β_2 of an outer end 70 of the ramped edges 60 of the détentes 58 and the corresponding ramped edges of the recesses 64.

[0020] When the mirror assembly 10 is assembled, the tabs 36 of the pivot tube 30 are extended through the notches 46 and 52, and the pivot tube 30 is rotated so that the tabs 36 align with the projections 54 between the notches 52. The pivot spring 32 applies pressure to the projections 48 between the notches 46 and the upper rim 34 of the pivot tube 30 so that the case frame 16 is secured to the base frame 24. The case frame 16 is able to rotate on the pivot tube 30 and the mounting member 50 against the bias of the spring 32 so that the housing 14 can be rotated relative to the arm 20.

[0021] When the mirror assembly 10 is in the unfolded position, the détentes 58 are positioned within the recesses 64 and the bias provided by the spring 32 tightly holds the housing 14 in this position. By applying enough forward or backward force to the housing 14, either manually or electrically, the ramped edges 60 of the détentes 58 allow the housing 14 to be rotated against

the bias of the spring 32. When the housing 14 is rotated to a forward folded position, the détentes 58 are positioned in the recesses 64 one position over from the unfolded position in a clock-wise direction. When the housing 14 is rotated to a rearward folded position, the détentes 58 are positioned in the recesses one position over from the unfolded position in a counter-clockwise direction. Both sides of the détentes 58 are angled for this purpose.

[0022] As mentioned above, the ramp angle β_1 of the inner end 68 of the ramped edges 60 of the détentes 58 is steeper than the ramp angle β_2 of the outer end 70 of the ramped edges 60 of the détentes 58. Figure 6 is a cross-sectional view through line 6-6 in figure 4 of the outer end 70 of one of the détentes 58, and figure 7 is a cross-sectional view through line 7-7 in figure 4 of the inner end 68 of one of the détentes 58. The ramp angle of the ramped edges 60 changes gradually and continuously from the ramp angle β_1 to the ramp angle β_2 when moving from the inner end 68 to the outer end 70. In a preferred embodiment, the width of top planar surface of the détentes 58 remains constant. However, it will be readily appreciated by those skilled in the art that in other embodiments the width of the planar surface can vary without deviation from the scope of the present invention.

[0023] In one embodiment, the relative angle of the ramped edges 60 of the détentes 58 is determined by equation (1) below. This difference between the ramp angle β_1 and the ramp angle β_2 allows the entire surface of the ramped edges 60 to make contact with the corresponding edge of the recess 64

when the housing 14 is rotated to decrease the wear of the détentes 58 and increase the fold durability of the mirror assembly 10.

$$\beta_2 = \tan^{-1}(r_1 / r_2) \tan(\beta_1) \quad (1)$$

[0024] While the subject invention is discussed showing a pivot tube arrangement, it will be readily appreciated by those skilled in the art that the features of the present invention may be incorporated into other mirrors. For instance, other mirror pivot designs incorporate other means of coaxial location, such as a tube extending from the head through a hole in the base, or conical ribs on the base that fit into a conical slot in the mirror head. It will be readily appreciated that the specialized ramp détentes and twisted plane ramp geometry (used for load distribution) set forth herein may be used on pivotal mirror constructions other than the one described herein.

[0025] The foregoing discussion discloses and describes merely exemplary embodiments of the present invention. One skilled in the art will readily recognize from such discussion and from the accompanying drawings and claims that various changes, modifications and variations can be made therein without departing from the spirit and scope of the invention as defined in the following claims.

CLAIMS

What is claimed is:

1. A mirror assembly comprising:
 - a mounting structure including a cylindrical mounting member having a top surface, said top surface including a plurality of détentes having ramped side edges; and
 - a foldable structure including an internal bore, said internal bore including a mounting portion that accepts the cylindrical mounting member, said mounting portion including a plurality of recesses having angled edges that accept the détentes, said foldable structure being rotatable on the mounting member, wherein an angle β_1 of the ramped edges of a short radius r_1 end of each détente has a steeper angle than an angle β_2 of the ramped edges of a long radius r_2 end of each détente.
2. The mirror assembly according to claim 1 wherein the relationship of the angle of the ramped edges of the détentes is defined by $\beta_2 = \tan^{-1}(r_1/r_2) \tan(\beta_1)$.
3. The mirror assembly according to claim 1 further comprising a pivot tube extending through the bore and being partially positioned within the mounting member and a pivot spring positioned within the bore, said housing pivoting on the pivot tube against the bias of the spring.

4. The mirror assembly according to claim 1 wherein the plurality of détentes is three symmetrically disposed détentes.

5. The mirror assembly according to claim 1 wherein the ramp angle of the ramped edges changes gradually and continuously from the ramp angle β_1 to the ramp angle β_2 .

6. The mirror assembly according to claim 1 wherein a top planar surface of each détente has a substantially constant width through the entire length of the détente.

7. The mirror assembly according to claim 1 wherein the mounting structure and the foldable structure are plastic molded components.

8. The mirror assembly according to claim 1 wherein the mirror assembly is a vehicle side mirror assembly.

9. A vehicle side mirror assembly comprising:
a mounting bracket including a cylindrical mounting member having a top surface, said top surface including three symmetrically disposed détentes having ramped side edges;
a foldable housing including an internal bore, said internal bore including a mounting portion that accepts the cylindrical mounting member, said

mounting portion including three symmetrically disposed recesses having angled edges that accept the détentes, said housing being rotatable on the mounting member; and

a pivot tube extending through the bore and being partially positioned within the mounting member, said housing pivoting on the pivot tube, wherein an angle β_1 of the ramped edges of a short radius r_1 end of each détente has a steeper angle than an angle β_2 of the ramped edges of a long radius r_2 end of each détente, and wherein the relationship of the angle of the ramped edges of the détentes is defined by $\beta_2 = \tan^{-1}(r_1/r_2)\tan(\beta_1)$.

10. The mirror assembly according to claim 9 wherein the ramp angle of the ramped edges changes gradually and continuously from the ramp angle β_1 to the ramp angle β_2 .

11. The mirror assembly according to claim 9 wherein a top planar surface of each détente has a substantially constant width through the entire length of the détente.

12. The mirror assembly according to claim 9 wherein the mounting bracket and the foldable structure are plastic molded components.

13. A method of folding a mirror assembly, said method comprising:
- providing a mounting bracket including a cylindrical mounting member having a top surface, said top surface including a plurality of détentes having ramped side edges, wherein an angle β_1 of the ramped edges of a short radius r_1 end of each détente has a steeper angle than an angle β_2 of the ramped edges of a long radius r_2 end of each détente;
 - providing a housing structure including an internal bore, said internal bore including a mounting portion that accepts the cylindrical mounting member, said mounting portion including a plurality of recesses having angled edges that accept the détentes;
 - providing a pivot tube extended through the bore and being partially positioned within the mounting member; and
 - rotating the housing structure on the pivot tube and the mounting member so that the edges of the détentes push against corresponding edges of the recesses along the entire length of the edges of the détentes.

14. The method according to claim 13 wherein providing a mounting bracket includes providing a relationship of the angle of the ramped edges the détentes defined by $\beta_2 = \tan^{-1}(r_1/r_2)\tan(\beta_1)$.

15. The method according to claim 13 wherein providing a mounting bracket includes providing three symmetrically disposed détentes.

16. The method according to claim 13 wherein providing a mounting bracket includes providing the ramp angle of the ramped edges that changes gradually and continuously from the ramp angle β_1 to the ramp angle β_2 .

17. The method according to claim 13 wherein the mounting bracket and the housing structure are plastic molded components.

WEAR-PROOF DÉTENTE FOR FOLDING MIRRORS

ABSTRACT OF THE DISCLOSURE

A folding assembly for a vehicle side mirror that employs specialized ramped détentes. The folding assembly includes a pivot tube and a pivot spring rotatably coupled to a case frame and rigidly coupled to a base frame. The base frame includes a series of ramped détentes that are seated within corresponding recesses in the case frame. The inside angle of the ramps of the détentes is steeper than the outside angle of the ramps of the détentes according to a predetermined formula so that when the case frame is rotated relative to the base frame, and the détentes move out of their recesses, the force of the rotation is distributed along the entire length of the ramp to increase the durability performance of the mirror and thus its longevity.

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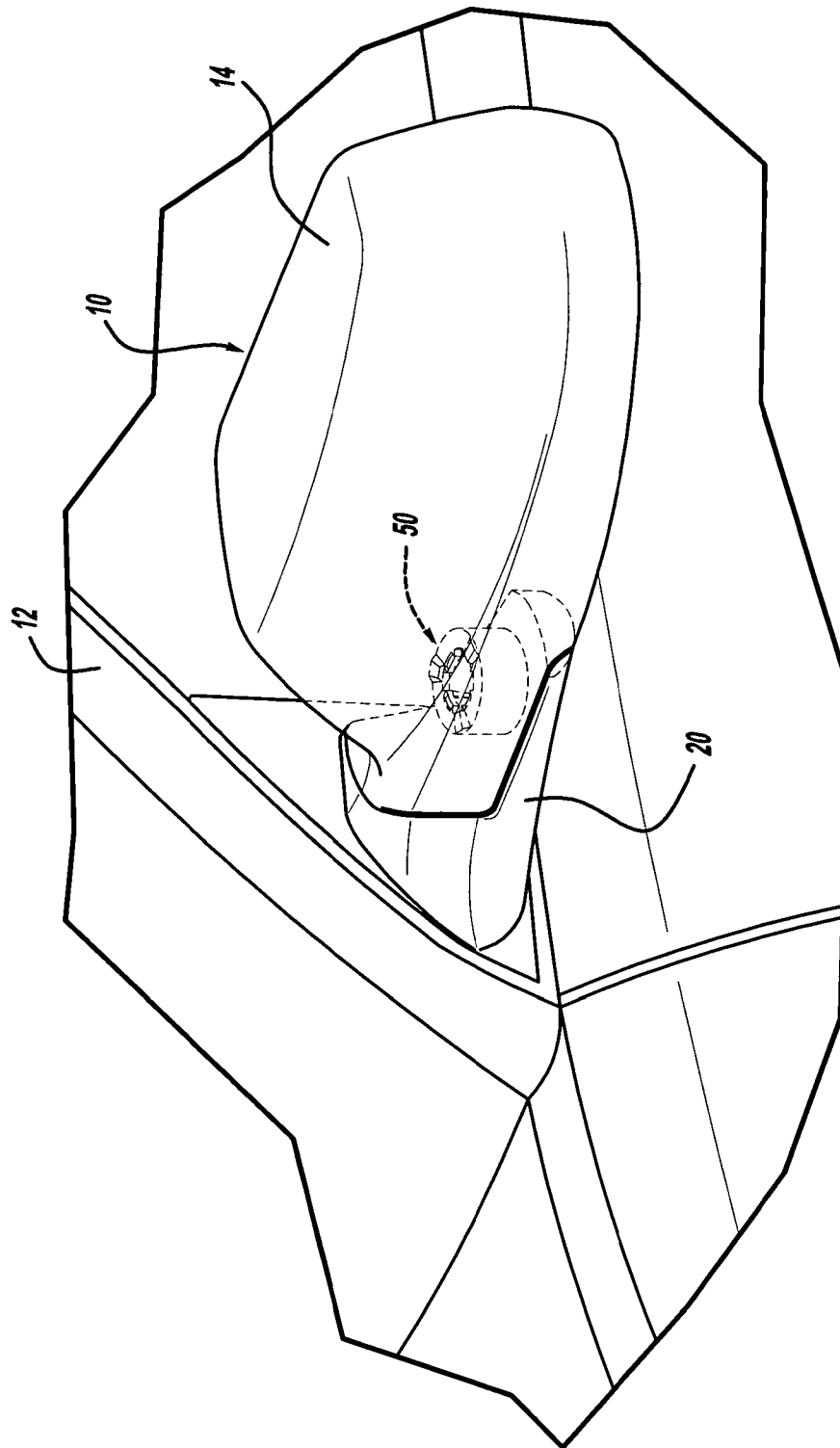
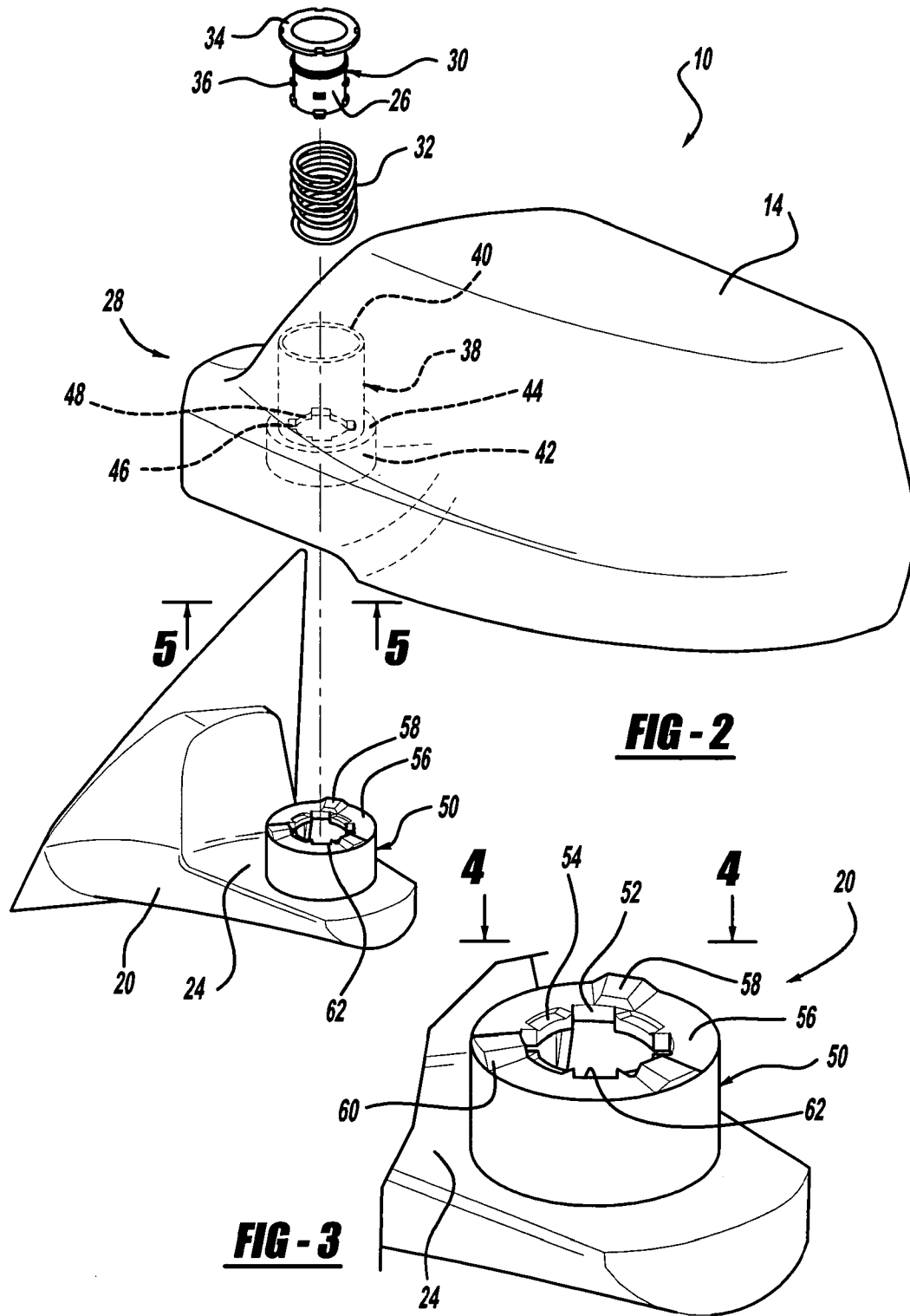
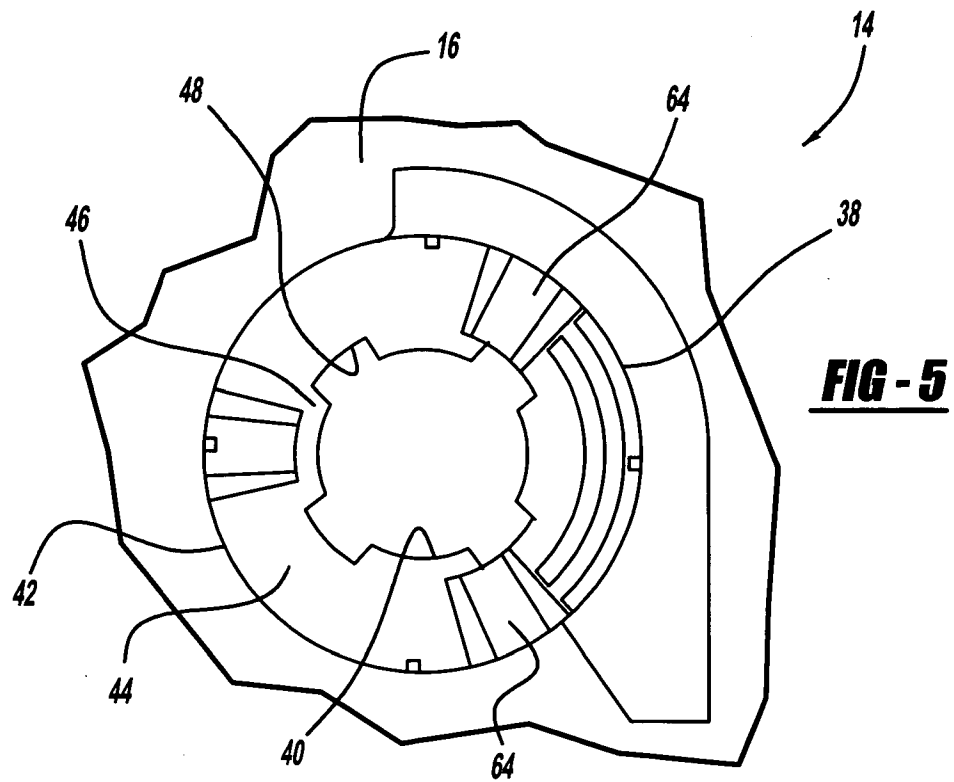
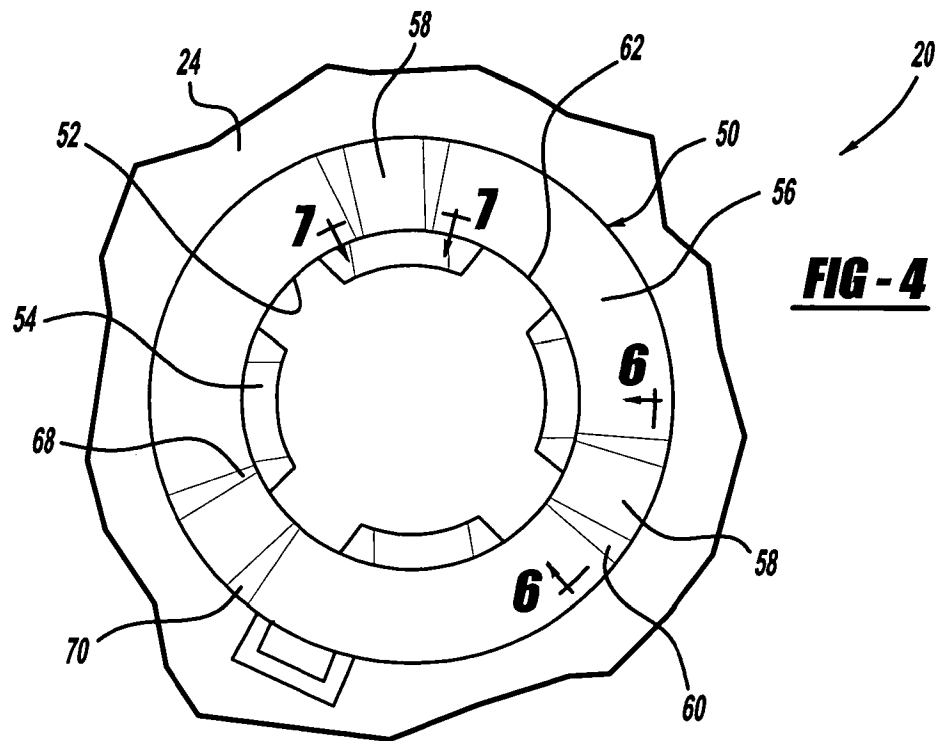


FIG - 1

2/4



3/4



4/4

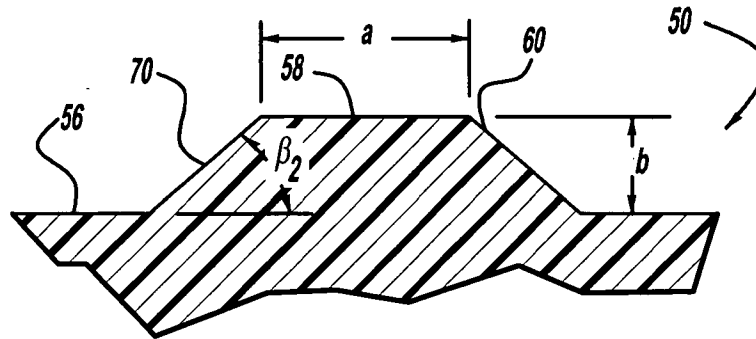


FIG - 6

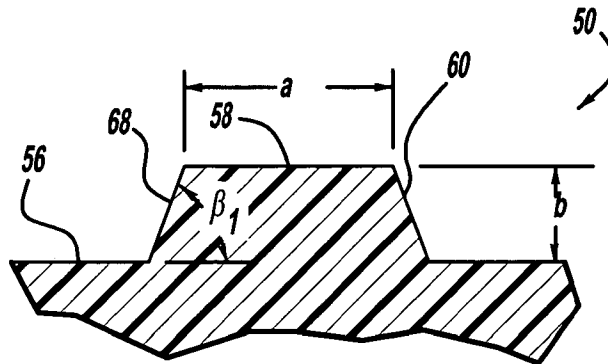


FIG - 7

APPLICATION DATA SHEET

Application Information

Application Number::

Filing Date::

Application Type:: Provisional

Subject Matter:: Utility

CD-ROM or CD-R?: None

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Title Line Two:: MIRRORS

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Request for Early Publication:: No

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Suggested Drawing Figure:: 1

Total Drawing Sheets:: 4

Small Entity:: No

Petition Included?: No

Secrecy Order in Parent Appl?: No

Applicant Authority Type:: Inventor

Primary Citizenship Country:: US

Status:: Full capacity

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State or Province of Residence:: MI

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